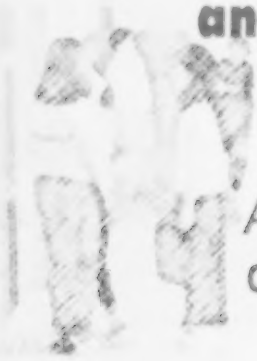
Support for Students who are Deaf or Hard of Hearing in an Inclusive Setting



A Guide for Administrators and Teachers

Atlantic Provinces Special
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Introduction

This book has been designed as a resource to administrators and teachers who provide educational programs for students who are deaf or hard of hearing throughout the Atlantic Provinces. It provides information on hearing loss, the implications of a hearing loss on a child's development, classroom strategies and outlines the services provided by APSEA.

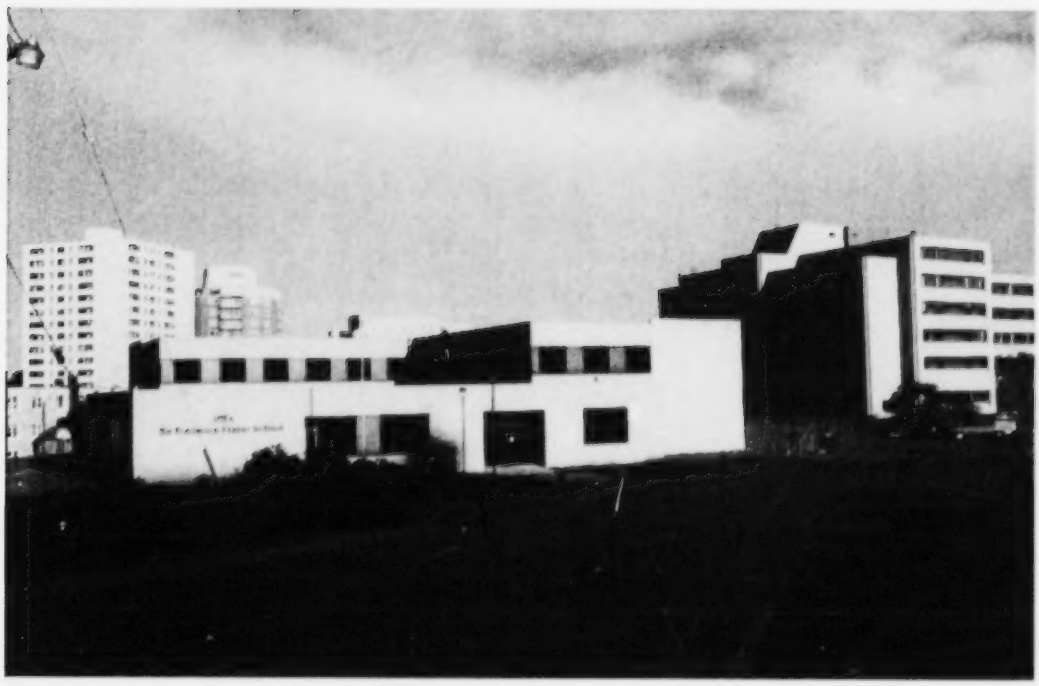
Acknowledgment and thanks are extended toward the APSEA staff who contributed to the development of this guide.

Mission Statement

APSEA is committed to working co-operatively with families, school districts/boards and service agencies to provide opportunities for the educational and personal growth of children and youth who are deaf or hard of hearing in the communicative and instructional contexts appropriate to and supportive of students' linguistic, academic and social needs.

Chapter 1

Atlantic Provinces Special Education Authority (APSEA)



Who We Are

The Atlantic Provinces Special Education Authority (APSEA) Centre is located in Halifax, Nova Scotia. The APSEA Centre provides administrative, technological, consultative and training support, was well as short-term programs in Atlantic Canada. The central focus of the organization is to provide educational and support services to youth who are deaf or hard of hearing or blind or visually impaired in the Atlantic Provinces. All services are initiated on a referral basis.

Programs and services to students who are deaf or hard of hearing have roots going back to 1856. Over the years, the organization has been known as the School for the Deaf (Halifax); the Interprovincial School for the Deaf (ISD) 1961 (Amherst); the Atlantic Provinces Resource Centre for the Hearing Handicapped (APRCHH); the Atlantic Provinces Special Education Authority Resource Centre for the Hearing Impaired (APSEA-RCHI) and since 1995, as the Atlantic Provinces Special Education Authority (APSEA) (Halifax).

The changes in organizational structure from *School for the Deaf* to *Resource Centre* to *programs in inclusive settings* reflect the evolution of educational and political philosophies over the years.

Programs and services offered by APSEA provide support for children and youth who are deaf, deaf-blind and hard of hearing. APSEA serves children and youth within this population from birth to 21 years of age residing in Atlantic Canada.

These services are provided through preschool/parent education programs, resource rooms, itinerant teachers, tutors, educational interpreter/assistants, counselling and transition services in New Brunswick and Nova Scotia.

APSEA Organization

Services We Provide

A brief description of APSEA services is provided below.

Amplification and Technology Services

- Maintenance of student's personal hearing aids.
- Maintenance of student's FM hearing aid systems.
- Provision of technical computer support for APSEA teachers.

Assessment Services

- The Assessment Team is made up of an audiologist, a psychologist, an academic language evaluator and a vocational evaluator.
- Comprehensive psychoeducational assessments may be completed on students entering the school system for the first time.
- Assessments are completed on students who are experiencing academic difficulty.
- Assessments are provided for students to assist in transition planning.
- Written assessment reports are shared with school teams.

Consultant Services

Consultant for Educational Interpreter/ Assistants (EI/A)

- Provides inservices and support to school districts on the EI/A service.
- Visits the student, school personnel and EI/A to facilitate the use of the service.
- Provides written reports to the EIA's itinerant teacher and APSEA provincial supervisor.
- Co-ordinates sign communication proficiency interviews for APSEA staff.
- Co-ordinates inservices for EI/A's.
- Co-ordinates summer programs.

Counselling Services

Student and Family Counsellor

- Visits schools and home settings where students/parents are dealing with issues that are impinging on their personal and educational development.
- Works with the educational team to help facilitate the development of behaviour management strategies.
- Collaborates with school districts and other agencies to establish the necessary support to help the child function at home and at school.
- Provides direct counselling service to students where appropriate.

Interpreter Services

Educational Interpreter/Assistant (EI/A)

- Facilitates communication between persons who are hearing and persons who are deaf.
- Provides tutoring as directed by the teacher or other appropriate educational personnel.

Itinerant Teacher Services

Itinerant Teacher

- Provides service to students in the public school system.
- Is responsible for educational interpreter/assistants (EI/A) and APSEA tutors.
- Assists in the development of individual assessment, structured programming in auditory skills development and meaningful activities to generalize speech, language, cognition and communication goals.
- Works with the parents and other professionals to develop an Individual Service Plan for auditory-verbal therapy.
- Collaborates with professionals at the hearing and speech clinics and cochlear implant centers.
- Provides follow-up written reports to the itinerant teacher and APSEA provincial supervisor to share with the student's team.
- Provides direct service to students and /or preschoolers who have a severe language delay due to their deafness.
- Provides consultative services and inservices to school district/board personnel.
- Develops program support for those students who receive direct, EI/A or tutorial service.
- Collaborates with classroom teachers to help them modify materials and programs for student's use.
- Co-ordinates technical support in the care and use of amplification equipment and cochlear implant technology.
- Makes earmold impressions and fittings.

Parent Education/Preschool Services

Parent Educator

- Designs programs to serve the individual needs of preschool children who are deaf or hard of hearing.

Resource Teacher Services

Resource Room Teacher

- Provides support for students whose current linguistic and communicative needs require intensive intervention.
- Provides an individualized language program.
- Collaborates with teachers in the school to gradually move the students into an inclusive setting.
- Is responsible for APSEA teacher assistants and EI/A's, who facilitate the student's transition into an inclusive classroom setting.

Short-Term Programs

- Provides comprehensive levels of programming which may be difficult to incorporate in an integrated setting.
- Focuses on the mastery of specific skills or address specific learning or behavioural difficulties.
- Involves parents and public school staff in the design, implementation, and follow up to short-term

programs.

- Varies in length to a maximum of one semester.

Transition Services

Transition Planning Facilitator

- Establishes future goals with students and parents in the areas of education, career, housing, health, recreation and finance.
- Organizes and facilitates government sponsored special employment programs for students.
- Advocates for adaptations and modifications of post-secondary programs to meet the individual needs of students.
- Establishes links with business and industry for work placement positions.
- Organizes job shadowing and visits to industry.
- Organizes and facilitates government sponsored special employment programs for students.

How We Can Work Together

APSEA acts as a support service for the inclusion of students who are deaf and hard of hearing in public school. The level of support services is determined collaboratively by APSEA, the school district/board and the parents. These services can include, where appropriate, parent education/preschool services, resource rooms, interpreter support (oral, manual and graphic), itinerant teachers, tutors, psychoeducational assessment, short-term programs, consultative services in the areas of auditory-verbal therapy, multi-needs students, co-op education, transition planning, family counselling and sign communication. APSEA staff provide inservices and workshops to the classroom teachers to familiarize them to the needs of students who are deaf or hard of hearing and provide the strategies to facilitate learning.

As a support to parents and school district/board programs, APSEA receives referrals from a number of agencies and individuals. Preschool children are most often referred by a pediatrician or audiologist as soon as a hearing loss is diagnosed.

All referrals go directly to the Director of Programs for Students who are Deaf or Hard of Hearing in Halifax, Nova Scotia. Referrals for school-aged children are made by the school district/board.

Requests for consultative services with the EIA Consultant, Student and Family Counsellor, short-term programs, etc. are made by the school team through the provincial program supervisor.

As a collaborative service, APSEA provides the expertise to the schools and districts/boards to enable students who are deaf and hard of hearing to achieve their potential.

Chapter 2

Hearing, Hearing Loss and Hearing Aids

Sound

Sound is created when some force sets an object into vibration, the vibrating object then sends a sound wave travelling through the medium in which it is vibrating. Therefore, sound is created by the movement or vibration of molecules in the air. Vibration refers to back-and-forth movement. To give rise to a sound wave, an object must be set in motion by a force causing molecular displacement or disruption of air particles. The human vocal cords are an example of a vibrating object. When they vibrate, they produce speech sounds.

Sound is propagated in an elastic medium, which in our everyday environment is air. Sound does not exist in a vacuum. Sound travels in all directions from the sound source, in somewhat the way a pool of water carries ripples from a dropped pebble.

The essentials for sound to be created and heard are a vibrator of some sort, a force to set the vibrator into vibration, a medium to convey the wave motion originating at the vibrator, and a hearing mechanism that can receive and perceive the energy of the propagated wave.

Two parameters of sound that defines its basic characteristics are frequency and intensity.

1. Frequency is the number of vibrations per second. It is measured in Hertz (Hz) or cycles per second. We perceive frequency as pitch. The human ear responds to frequencies between the very low pitch sound of 20 Hz to the very high pitch sound of 20,000 Hz. An example of low frequency speech sounds would be the vowel sounds such as: a, e, i, o, and u. An example of high frequency speech sounds would be the consonant sounds such as: f, s, and sh.

2. Intensity is the amount of movement or displacement of air particles that occurs when a sound is created. The greater the amount of displacement, the more intense, or louder the sound becomes. Intensity is measured in decibels (dB). Intensity is psychologically perceived as loudness.

The human ear is exposed to a wide range of sounds. The threshold of hearing is 0 dB, ie., sounds that are just audible. The threshold of pain for sound is approximately 130 dB. The area between these two measurements is termed the field of hearing. This field is ample for the perception of all speech sounds. The lowest tones which occur in speech are about 200 Hz while the highest tones which occur in speech are about 8,000 Hz. Whispered speech has an intensity level of about 30 dB. Conversational speech has an average intensity of between 55 and 65 dB.

The Ear and Hearing

Hearing is important because initial communication and hence understanding, arises primarily from learning spoken language through listening and building up symbolic thinking processes. Hearing is essentially a non-directive sense. We cannot see something unless we look at it, but we can hear things from anywhere around us. We are even capable of listening when we are asleep.

Hearing is a function of the auditory system, i.e., the ear. The ear consists of three parts: the outer ear or pinna, the middle ear and the inner ear or cochlea.

The outer ear has a shape that assists in collecting sound waves from the air which are then funneled down the ear canal. At the end of the ear canal passage the sound waves impinge on the eardrum or tympanic membrane. The eardrum separates the outer ear from the middle ear.

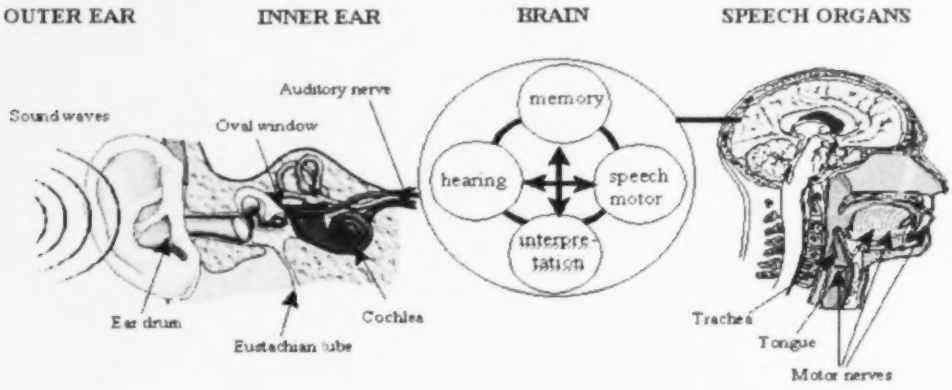
The middle ear is a small cavity which is ventilated from the back of the nose through the Eustachian tube.

The Eustachian tube allows for equalization of pressure on both sides of the eardrum enabling it to vibrate efficiently. The muffled sound with a head cold is often associated with Eustachian tube blockage.

The middle ear cavity is normally air filled. It contains three ossicles or bones which are the smallest bones in the human body. They are generally termed the hammer (malleus), anvil (incus) and the stirrup (stapes).

The three middle ear bones are connected to one another and act as a lever system to transmit and amplify movements of the tympanic membrane produced by sound waves. These sound waves are then transmitted to the oval window of the inner ear. The oval window is a membrane which separates the middle ear from the inner ear.

The organ of hearing in the inner ear is the cochlea which is a fluid-filled system. The fluid called endolymph and perilymph are in contact with the inner side of the oval window.



Vibrations of the middle ear bones are passed through the oval window and are transmitted through the cochlear fluid to nerve receptors in the cochlea. The nerve receptors in the cochlea respond to the frequency of the sound vibrations. The human ear has nerve receptors sometimes called hair cells. There are two types of hair cells, outer hair cells and inner hair cells. Each human ear has about 13,000 outer hair cells and 3,500 inner hair cells. Nerves from these receptors carry impulses to the brain, which interprets them as a sound of a certain pitch or loudness. The complex wave patterns of speech sound produce a pattern of nerve impulses. The brain learns by experience to attach some particular significance to the impulse pattern. The brain stores this pattern in memory and when it is received again, it is recognized.

Measurement of Hearing

Hearing can be measured using an audiometer, an electronic instrument that produces pure tones of adjustable frequencies at various intensities. The hearing test involves finding the lowest intensity level at which a person responds for the various frequencies in the range of 250 Hz to 8000 Hz. The hearing test results indicate a person's threshold of hearing and are plotted on a chart called an audiogram. For a person with normal hearing, sounds are just audible at 0 dB Hearing Level.

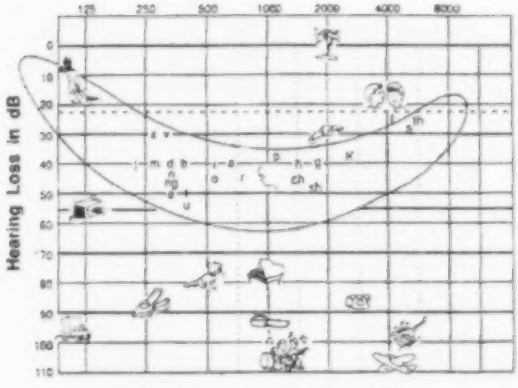
Hearing loss can be grouped into four general categories: mild, moderate, severe and profound.

- *Mild Hearing Loss*: If a person has a mild hearing loss of between 25 and 40 dB Hearing Level, they will perceive conversational speech as people with normal hearing would hear a whisper. The person with a mild hearing loss will perceive loud speech as a normal conversational voice.

- *Moderate Hearing Loss*: If a person has a moderate hearing loss between 40 and 70 dB Hearing Level, they will perceive a loud voice only as a whisper in the unaided condition.

- *Severe Hearing Loss*: If a person has a severe hearing loss between 70 and 90 dB Hearing Level, they will require a hearing aid to perceive any aspect of spoken language.

- *Profound Hearing Loss*: If a person has a profound hearing loss greater than 90 dB Hearing Level, they may have auditory awareness of sound when wearing their hearing aid, but would most likely not be able to discriminate speech by auditory means alone.



Deafness

Deafness, or hearing loss, may arise if any part of the hearing system fails to develop adequately or is damaged. The table below summarizes the clinical characteristics of the two major types of hearing loss - conductive hearing loss and sensory neural hearing loss. *Conductive hearing loss*, caused by middle ear infection, is the most common active disease in young children. It results in an interruption of the transmission of sound pressure waves on their pathway through the outer and middle ear mechanism to the inner ear or cochlea. This type of hearing loss is often responsive to medical or surgical treatment.

A *sensory neural hearing loss* results from damage to the sensory mechanism or cochlea. This type of hearing loss can also result from damage to neural elements and pathways such as the auditory nerve or the auditory cortex.

Two Types of Hearing Loss

	Conductive	*Sensory Neural*
1. Site	Outer or middle ear.	Inner ear or cochlea and the nerve pathways to auditory centres in the brain.
2. Deafness because	Vibrations do not reach the inner ear or arrive there attenuated.	Vibrations are not registered by nerve cells in the inner ear because they are damaged, or have never developed.
3. Reasons for deafness	Outer ear - obstruction such as impacted ear wax. Middle ear - vibration of the eardrum or middle ear bones is interrupted by: fluid build up in the middle ear, ear infections, or breakage in the ossicular chain	1. Heredity (or genetic factors) 2. Rubella or German measles. 3. Diseases of perinatal period. 4. Diseases of later childhood, for example, meningitis. 5. Noise induced hearing loss.
4. Amenable to treatment	Medical and surgical procedures can be effective.	There is not a cure for sensory neural hearing loss, however a cochlear implant may be an option for a deaf person.
5. Characteristics of hearing loss	Loss for low and high pitch sounds is similar. Usually a mild to moderate degree of hearing loss.	Usually the loss of hearing for high pitches is greater - often much greater than for low pitch sounds. Hearing loss can range from mild to profound.
6. How speech is heard	Muffling in the perception of speech. Usually there is minimal distortion in the perception of the speech signal. Hearing aids sound very clear.	Distortion in the perception of speech. Vowels may be heard relatively well; consonants are often distorted, if heard at all. Hearing aids sound somewhat distorted, but are necessary.

Understanding an Audiogram

Hearing tests are most often performed by an audiologist, a non-medical specialist who studies hearing problems and how to alleviate them. Audiologists are university trained and hold a Master's Degree in Clinical Audiology.

An audiogram is a graph which charts what a person can hear. The graph is represented by frequency and intensity. The audiogram is produced by testing the person in a sound treated room, with no other background noise, using pure tones directed through headphones or sound field via speakers. The audiogram does not demonstrate how well a person can understand connected speech, however, it does give a basic understanding of what a person can or cannot hear through his hearing. A line marked with O's represents hearing in the right ear. A line marked with X's represents hearing in the left ear. A line marked with A's, represents hearing when wearing a hearing aid. Most speech sounds fall in the area between 30 and 60 decibels. That means that in order to understand speech, a person must be able to hear sounds within the 30-60 decibel range.

Although a person is able to hear more sounds with a hearing aid, the sounds may be distorted and lacking in clarity because the person's hearing system is not working properly. A hearing aid can make sound louder, but it may not make it clearer.
An audiogram can help you understand a person's hearing loss and can also guide in some general assumptions about the person's communication abilities. (A hearing loss can vary greatly from individual to individual.)
It is much better to describe a hearing loss using descriptive terms, instead of percentages when categorizing hearing levels and estimating the degree of hearing loss. Traditionally, the average of air conduction thresholds from 500, 1000, and 2000 Hz of each ear is used in categorizing the degree of hearing loss. The majority of all speech frequencies lie within this range (500 to 2000 Hz). This Pure Tone Average (PTA) is expressed in decibels (dB), the unit of measurement of sound.

Average Hearing Threshold Levels from 500, 1000, and 2000 Hz (1969 ANSI reference)	Descriptive Term
-10 to 25 dB HL	Normal limits
(15 to 25 dB for children)	Slight or minimal hearing loss
25 to 40 dB	Mild hearing loss
41 to 55 dB	Moderate hearing loss
56 to 70 dB	Moderately severe hearing loss
71 to 90 dB	Severe hearing loss
91 dB plus	Profound hearing loss

When categorizing hearing loss, it is necessary to take into account the following variables:

- Frequency characteristics of the loss;
- Slope of the audiogram;
- Age of onset of the hearing loss;
- Type of hearing loss (conductive, sensory neural, or mixed);
- Differences in hearing between the ears;
- Speech and Language Skills
- Presence of other physical, intellectual, or emotional handicaps;
- Types of listening environments.

Therefore, the descriptive terms used (normal, slight, mild, moderate, moderately severe, severe, and profound), are also simplistic in their approaches and do not take into account all of the aforementioned variables. Audiologists often use other adjectives to describe the degree of loss.

For example:

gradually sloping - the loss gradually increases from the low frequencies to the high frequencies

sharply sloping - the loss increases sharply above a certain frequency;

flat - the loss is fairly uniform for all test frequencies;

conductive - the loss is due to outer and/or middle ear problems;

sensory neural - the loss is due to problems at the cochlea or with the auditory nerve (inner ear problems);

mixed - the loss is due to a combination of conductive and sensory neural reasons;

symmetrical - the loss is fairly even between the ears;

asymmetrical - the loss is very different between the ears;

prelingual - the loss occurred before speech and oral language skills developed;

congenital - the loss was present at birth;

adventitious - the loss was acquired after birth;

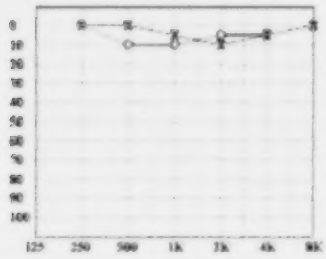
bilateral - the loss occurs in both ears;

unilateral - the loss is in one ear.

Used together, these descriptive terms and adjectives help to categorize the hearing loss and give an appreciation for the habilitative needs.

Following are some sample audiograms that represent varying degrees of hearing loss.

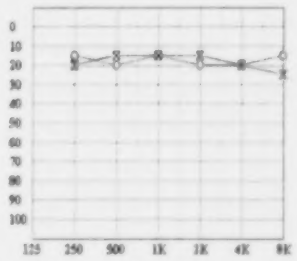
Normal hearing: Normal hearing acuity for children is 15 dB Hearing Level or better at all frequencies with normal middle ear function, ie., absence of ear infection. Individuals with normal hearing acuity are able to hear normal conversational speech even in a noisy listening environment.



Normal Hearing

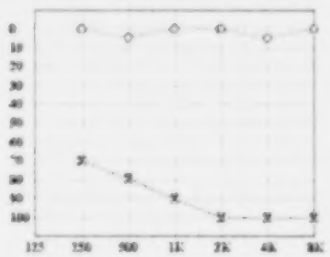
Minimal hearing loss: Because the normal hearing boundary for children is 15 dB HL and a mild hearing loss is typically considered to start a 25 dB HL, a minimal or slight hearing loss can be defined as one that occurs from 16 to 25 dB HL. Children with minimal hearing losses experience problems in the following areas: hearing faint or distant speech; hearing subtle conversational cues that could cause a child to react inappropriately; following fast-paced verbal exchanges; and hearing the fine word-sound distinctions that denote plurality, tense, and possessives. Most individuals with a minimal hearing loss do not use hearing aids. Preferential classroom seating (seating the student with minimal hearing loss in close proximity to where the teachers provide classroom instruction) and in some cases the use of a sound field system can be of benefit to a student with a minimal hearing loss.

Mild Hearing Loss: If a person has a mild hearing loss A sound field system consists of the teacher wearing a microphone that sends the teacher's voice to two or four strategically placed speakers in the classroom. Many children experience a minimal hearing loss in association with a head cold or an ear infection.



Minimal Hearing Loss

Unilateral hearing loss: A unilateral hearing loss is a loss that occurs in one ear only with the better ear often hearing within normal limits. Individuals with unilateral hearing loss have difficulty hearing in the presence of background noise. They also have great difficulty localizing the source of sounds. A person with a unilateral hearing loss may or may not benefit from wearing a hearing aid in their ear with hearing loss. If they experience a profound unilateral hearing loss, a hearing aid would not normally be recommended. Preferential classroom seating (with the better ear oriented toward the teacher) will be beneficial to the student with a unilateral hearing loss. A sound field system can also be of benefit to a student with a unilateral hearing loss.



Unilateral Hearing Loss

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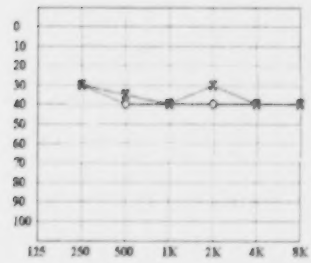
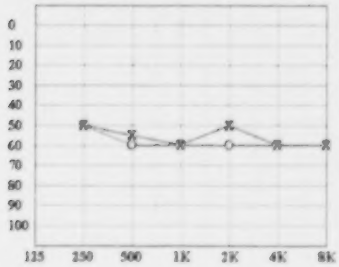


Mild Hearing Loss

Moderate Hearing Loss: If a person has a moderate hearing loss between 40 and 70 db Hearing Level, they will perceive a loud voice as a whisper in an unaided condition.



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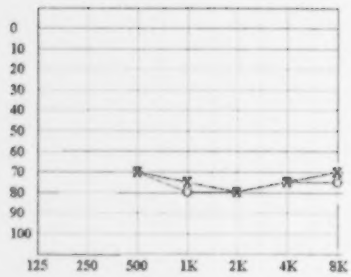
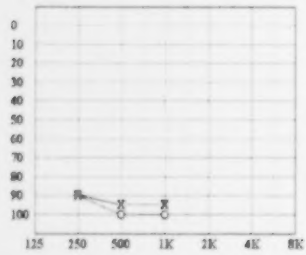


Severe Hearing Loss

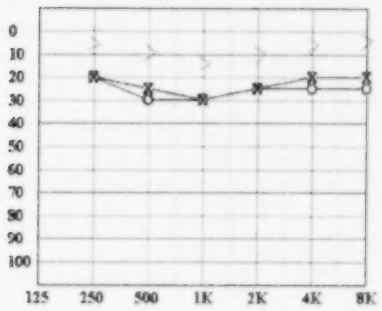
Profound Hearing Loss: If a person has a profound hearing loss greater than 90 dB Hearing Level, they may have auditory awareness of sound when wearing their hearing aid, but would most likely not be able to discriminate speech by auditory means alone.



Profound Hearing Loss

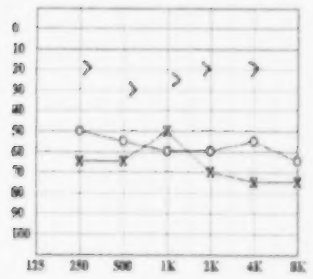
Conductive Hearing Loss: A conductive hearing loss is caused by an abnormal reduction or attenuation of sound as it travels from the outer ear to the inner ear or cochlea. If a structure of the conductive mechanism is in some way impaired, its ability to conduct sound is reduced, resulting in less sound being delivered to the cochlea. The most common form of conductive hearing loss in children results from ear infections or otitis media which can result in a mild to moderate hearing loss that is temporary in nature. When the ear infection

resolves, the conductive hearing loss clears and hearing acuity usually recovers to within normal limits. This particular audiogram represents a mild conductive hearing loss.



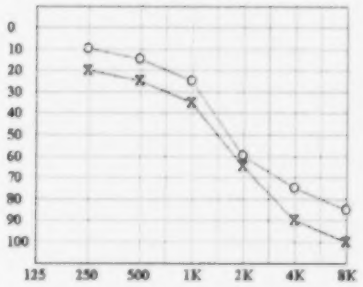
Conductive Hearing Loss

Mixed Hearing Loss: If a person experiences a hearing loss that has both a sensorineural and a conductive component, then the hearing loss is said to be a mixed hearing loss. A mixed hearing loss results when sound being delivered to an impaired cochlea or inner ear is attenuated by a disordered outer or middle ear. In some cases the attenuation caused by the disordered outer or middle ear can be treated medically. The sensorineural component of the hearing loss is a life long condition and cannot be treated medically. This particular audiogram represents a moderate mixed hearing loss.



Mixed Hearing Loss

High Frequency Hearing Loss: A high frequency loss is one where the hearing loss is restricted to the high frequency region of the audiogram. If a person has a high frequency hearing loss they will be able to hear the low frequency components of speech, such as vowel sounds, in a normal manner. However they will have difficulty hearing the high frequency components of speech, such as consonants, in a normal manner. Hearing aid amplification, which is specifically tuned to enhance high frequency sounds, is recommended for people with a high frequency hearing loss. This particular audiogram represents a severe to profound high frequency loss



High Frequency Hearing Loss

Residual Hearing

The hearing that is available to the person who is deaf or hard of hearing is referred to as "residual hearing". It is the responsibility of the audiologist, or hearing specialist, to ensure that the hard of hearing person makes maximum use of this residual hearing by providing the best possible amplification system available. If a child is to develop language though the auditory mode, then the utilization of residual hearing via the hearing aid becomes of prime importance. The child must learn to wear the hearing aid for all of his or her waking hours. The use of personal FM classroom amplification system will also be of benefit to the hard of hearing child. If the hearing aid is not used consistently in the classroom, then the student will struggle to achieve academic success.

The Hearing Aid

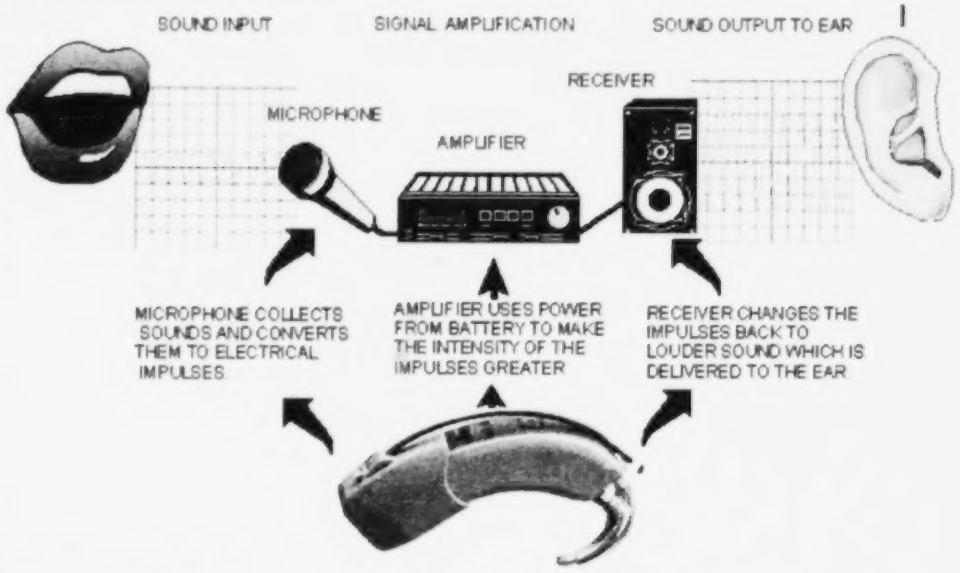
The hearing aid is simply an amplifier of sound. It enables a person to hear sounds louder, but it does not restore hearing acuity as glasses do for individuals who are nearsighted or far sighted. An electronic hearing aid consists of 4 basic components: a microphone, amplifier, battery and receiver.

- The **microphone,** picks up sound and converts it into an electrical signal.

- The **amplifier**, powered by the **battery**, increases the strength of the electrical signal.

- The **receiver** or speaker changes the amplified electrical signal back into sound. The sound is directed in the ear canal through the **earmold.**

Types of Hearing Aids


SOUND INPUT
SIGNAL AMPLIFICATION
SOUND OUTPUT TO EAR
RECEIVER
MICROPHONE
AMPLIFIER
MICROPHONE COLLECTS SOUNDS AND CONVERTS THEM TO ELECTRICAL IMPULSES
AMPLIFIER USES POWER FROM BATTERY TO MAKE THE INTENSITY OF THE IMPULSES GREATER
RECEIVER CHANGES THE IMPULSES BACK TO LOUDER SOUND WHICH IS DELIVERED TO THE EAR

The hearing aid that is recommended for an individual depends on the type and severity of the hearing loss and the person's ability to wear and operate the hearing aid. The appropriate hearing aid, worn at the recommended setting, should provide amplification to maximize the use of residual hearing and assist in the development of speech and language through listening. The hearing aid should be worn for all of a child's waking hours. There are three styles of hearing aids or amplification systems commonly worn by children in the regular classroom:

1) behind-the-ear hearing aids;

2) in-the-ear hearing aid and

3) FM radio-frequency amplification.

There are essentially three types of hearing devices:

- Conventional analog hearing aids, which basically amplify sound. This is the older hearing aid technology and the audiologist chooses an electronic circuit that most closely matches a person's hearing loss needs. These hearing aids can only be adjusted in one or two ways and future upgrades are not possible.
- Digitally programmable hearing aids, which are programmed by a computer to match an individual's specific hearing loss needs. Many parameters can be adjusted to best meet an individual's hearing needs by connecting the hearing aid to a programmer. A programmable hearing aid is basically an analog device by its design, but has digitally programmed instructions on the microchip inside the hearing aid.
- 100 percent digital hearing instruments operate automatically and are programmed through a code of binary numbers to respond to a variety of listening environments. Digital hearing aids are manufactured with a microchip inside the hearing aid. Digital hearing aids have the most flexibility in terms of multiple adjustments and future upgrades. The hearing aid responds to multiple sounds and automatically adapts to a large number of listening environments. Many digital hearing aids provide automatic volume control and it is not necessary to use a volume control, the hearing aid automatically adjusts the volume depending upon the listening situation.

FM Classroom Amplification

The regular classroom can be a noise intensive environment depending upon the particular activity. Many hearing aid users complain that they can hear quite well with their hearing aids, except when they are in noisy environments. The hearing aid tends to amplify all of the background noise making it difficult for the hard of hearing student to hear the teacher. FM classroom amplification systems have been designed to allow the hard of hearing student to hear the teacher with much more ease.

The FM system consists of a radio microphone worn by the teacher and the student's personal hearing aid attached by a direct audio input boot to a radio FM receiver. The teacher's voice is picked up by the receiver, directed to the student's personal hearing aid and then amplified to the comfortable listening level of the student.

This FM system ensures that the student receives consistent amplification as all sound is controlled by the student's own hearing aid. The major advantage of the FM system used in conjunction with the student's hearing aid is that it allows a high signal-to-noise ratio in a poor acoustic environment. This allows the teacher's voice to be always clearer than the classroom noise. The teacher's voice is presented to the student as if the teacher was speaking six inches away from the student's hearing aids no matter where they are located in the classroom. The personal FM system is worn by many hard of hearing students.

The Cochlear Implant

The multichannel cochlear implant was developed in the late 1970's. Extensive research since that time has resulted in continuing improvements in the technology. Valuable information has been obtained concerning the recipient's auditory development with the device. There are several types of cochlear implants world wide. In North America, the most common cochlear implant is the Nucleus 22, and more recently, the Nucleus 24 device developed by Cochlear Corporation. Another type of cochlear implant is the Clarion device developed by Advanced Bionics. Since 1995, the number of cochlear implant recipients has grown dramatically. There are more than 20,000 cochlear implant recipients worldwide. In North America, there are more than 4,500 children under the age of 18 who have received cochlear implants.

The cochlear implant is a device that, under appropriate conditions, helps provide a sense of sound to people who are totally or almost totally deaf. While it does not restore normal hearing, it may often help the wearer - with proper training - understand speech and perceive sounds from their environment.

A successful cochlear implant requires surgery, preceded by detailed evaluation of the patient, and followed by extensive training and rehabilitation. Most cochlear implants include a microphone, a speech processor, a transmitter, a receiver/ stimulator, and an electrode array. (See diagram). Some of these components are, as the name implies, implanted beneath the scalp of the user. Other components are worn externally.

The cochlear implant system takes sound from the environment and processes it. The system filters the sound through the person's individualized computer program and electrically presents the results to the auditory nerves leading to the brain. The implant bypasses the usual route for hearing and does not provide normal auditory information, nor does it guarantee any understanding of the information. The implant does, however, provide detection of speech and environmental sounds, and stimulation of the inner ear. Thus, the cochlear implant becomes a tool, giving the recipient access to his/her auditory environment.

Taking Care of FM Amplification Equipment

FM SYSTEMS	VISUAL INSPECTION	AUDITORY INSPECTION (Use Hearing Aid Stethoscope)
Housing	Are there any splits, deformities, visible damage, or missing screws?	Listen to feedback while gently shaking and twisting the housing. Are there any intermittencies heard?
Volume Control	Does the volume control rotate smoothly?	Connect hearing aid to FM system and listen with stethoscope while rotating and pressing on volume control with aid on. Are there intermittencies, static sounds or scratchiness? Is there volume? In case of Solaris, is switch on DAI?
Switches	Are switches intact? Do they move easily to clearly distinct positions?	On any combination, does the FM switch system fail to operate?
Environmental Microphone		Are speech sounds distorted? Are there any static or intermittent sounds? Are there environmental sounds when "off"?
FM Reception		Are speech sounds distorted? Is there noise or hum? Manipulation of case and volume control should have no effect.
Direct Input Cord	Is there any visible sign of damage, cracks or splits? Is there a loose connection to housing?	When switches are set correctly, is there good quality signal from the aid when connected to the input cord?
Cord Attachment	Is there a loose connection to the aid or the aid's boot? Does the system have a wrong cord or boot?	Are there any static sounds or intermittencies when the connections are manipulated?
Frequency Check	Does the oscillator colour (or number) of the transmitter match that of the receiver?	Do any of the removable oscillators fail to work with the matching transmitter?
Microphone strength	Is the lapel (or boom) microphone plugged in the correct socket?	Is the microphone abnormally weak? Are there any static sounds, intermittencies or distortion?
Charger	Are there any worn wires, bent or dirty contacts? Do batteries fail to charge or charge slowly? Do batteries fall off? Do charger lights operate?	

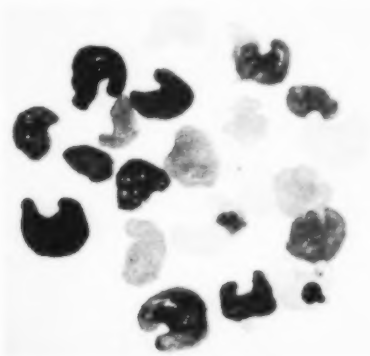
Taking Care of Hearing Aids

EAR LEVEL AIDS	VISUAL INSPECTION	AUDITORY INSPECTION (Use hearing aid stethoscope)
Battery	Is there sufficient voltage? (1.4 V) Is the battery clean and intact? (Discard a leaking battery.) Are the battery contacts clean, with sufficient tension? Does the battery compartment open and close smoothly?	There is a problem if you hear no feedback when the aid is held and turned full on with an open earmold and a fresh battery. Do you hear any motor-boating, buzzing or oscillation that goes away when the battery is changed?
Microphone & Receiver Opening	Is the microphone partially or completely clogged? Is there any visible damage?	
Housing	Are there any splits, deformities, damage, loose or missing screws upon visual inspection?	Listen to feedback while gently shaking and twisting the housing. Are there intermittencies?
Volume Control	Does the volume control rotate smoothly? Some digital models have automatic volume control and no volume control wheel.	Rotate and press on the volume control with the aid on. Do you hear any intermittencies, static, or scratchiness? Is there an even volume taper from soft to loud?
OTM Switch	Is the switch intact? Does the switch move easily to clearly distinct positions? O = Off / T = Telecoil / M = Microphone	When the aid is Off, no environmental sound or hum should be heard. Manipulation of the volume control should have no effect. When the aid is turned to Microphone, environmental sound should be heard. When turned to Telecoil, the aid is sensitive to magnetic coils such as the telecoil in a telephone.
Programming Switch	The programming switch may be a push button or toggle.	Can you hear a change in the sound quality (tone and loudness) of the hearing aid when changing the programming switch?
Earmold	The sound bore of the earmold should be clear of wax and excess moisture. Are there any cracks or rough edges on the earmold? Is the mold a comfortable fit without acoustic feedback at the recommended volume setting?	Do you hear any feedback when the sound bore is blocked with your finger? This may be an indication of internal feedback.

Earhook	Does the earhook have a loose attachment to the housing? Can it be screwed on tighter?	Acoustic feedback problems can be associated with a loose earhook.
Earmold Tubing	Does the tubing have a loose attachment to the mold? Does it have a loose attachment to the earhook? Is it cracked, brittle or crimped?	Acoustic feedback problems can be associated with a defective earmold tube.

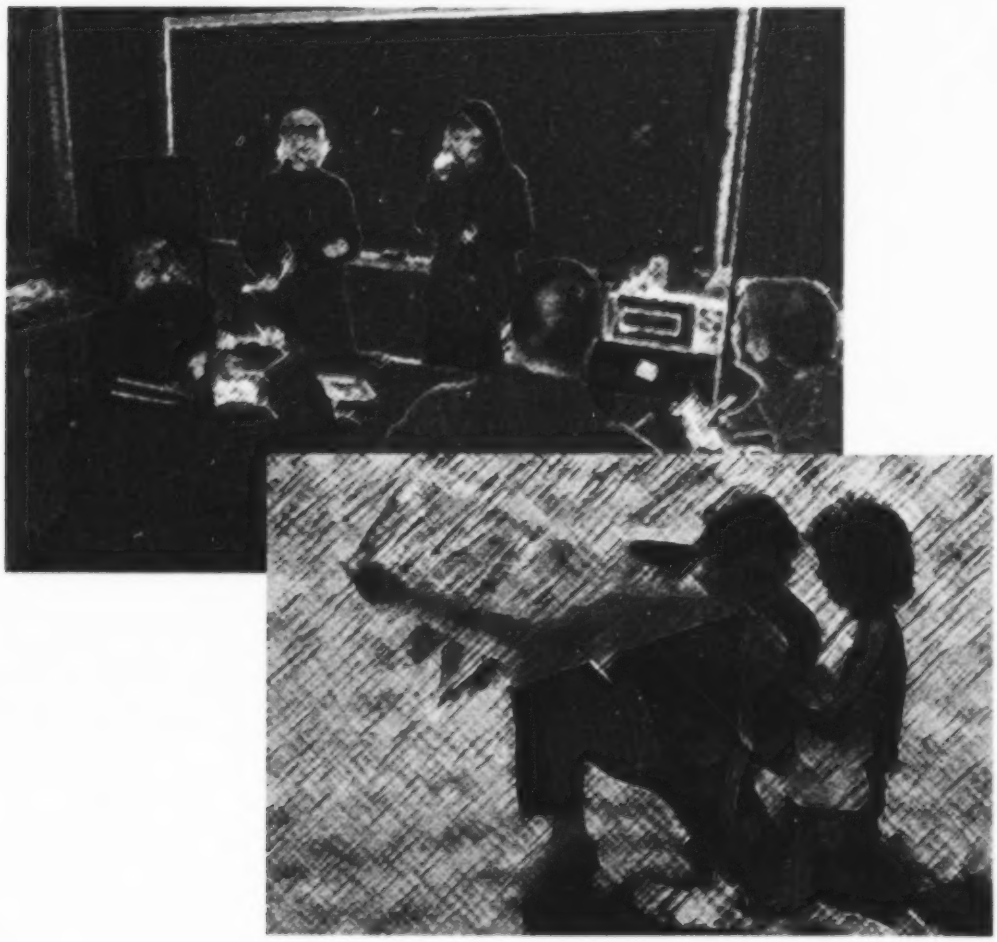
General Rules for Hearing Aid Care and Maintenance

1. Avoid exposing the hearing aid to extreme heat or cold.
2. Keep the hearing aid dry, for example use a dry aid kit to store the hearing aid overnight.
3. Handle the hearing aid gently. Do not drop it or bang it against harsh surfaces.
4. Have a hearing aid checkup at least once a year, by an audiologist.
5. Keep the earmold clean, use an earmold spray cleaner or disconnect the earmold from the hearing aid and wash it with mild soap and warm water. Dry thoroughly before connecting the earmold back to the hearing aid.
6. Always keep spare hearing aid batteries handy. Zink - Air batteries are recommended. Store them at room temperature.
7. Contact your audiologist or teacher of the deaf if the hearing aid problem is persistent.



Chapter 3

HOW HEARING LOSS AFFECTS SPOKEN AND WRITTEN LANGUAGE DEVELOPMENT



How Language Develops

Deafness inhibits the development of the most essential human function, communication. To understand the effects of deafness, we must first discuss language - its development, scope, and complexity.

Language has been defined as the mutually agreed upon systematic set of symbolic relationships which members of a community use to communicate and represent experience. The term "language", as used herein, will encompass the comprehension and expression of both the auditory (understanding and speaking) and visual (reading and writing) language systems. The auditory and visual systems, although not identical, are directly dependent upon each other. Children learn to read and write the language they already understand and speak.

Language competence is an acquired skill. Babies are not born with the ability to understand and produce grammatically acceptable utterances. However, this important communication skill is not taught, nor is it learned solely from imitation of adult models. In the early stages, linguistic and cognitive developments are linked. Children are active participants in learning about their world and their language. They listen to the environmental language tied to their own experience and guess at its meaning. They try out their own immature utterances and receive feedback from others in their language community. Gradually they learn the vocabulary and deduce the rules governing the production of more mature speech and grammar. This is a developmental process which generally involves no direct teaching. Considering the complexity of language, it is truly a marvelous feat. In fact, psycholinguists have postulated that human infants are born with a special inherited potential for language learning. This potential can only be activated by exposure to an adequate sampling of oral language in context. This language input is experienced along a continuum encompassing sensation, attention, perception, memory and storage, formation of symbols and concepts.

A disorder at any level of this hierarchy will affect higher development. When the deficiency exists at the level of sensation, as it does in the child born deaf, the auditory input is often reduced and distorted. Depending on the extent of the deafness, it may be altered to such a degree that the individual is denied sufficient language experience to capitalize on the innate human potential for language acquisition.

Effects of Deafness on Language Development

Deafness results in an auditory deprivation which impacts on the development of the auditory language system. Both comprehension and expression, i.e., understanding and speaking are affected. A primary goal of education is to develop a level of linguistic proficiency to function successfully in society. Hearing children at school entry, while not yet literate, are well on their way to developing linguistic proficiency. Spontaneously, without direct teaching, they have mastered the complex rule-governed language of their environment. They know most, if not all, of the speech sounds (phonology), the function words and affixes (morphology), and the syntactically correct sentence types (syntax) of their language. For them, becoming literate involves learning the visual or print form of the already mastered auditory language.

Reading and writing then become the vehicles for language expansion and for academic learning. At school entry, the child who is deaf or hard of hearing may not have attained the fluency in auditory language taken for granted in hearing children. The route to literacy or competency in the visual language system will be longer and more arduous than that of hearing peers. However, the innate human potential for language acquisition is there. For many children who are deaf or hard of hearing, the environmental trigger for continued activation of this potential will be the linguistically rich environment of the public school.

Students who are deaf or hard of hearing will present unique educational challenges. There are many barriers they face in attempting to comprehend classroom instruction and the educational materials provided for their use. These problems are mainly language based and may stem from one or more of three areas: the student may simply not have acquired the vocabulary or the language structures being utilized in the discussion; or the student may have not yet developed the pragmatic skills to help them deal with their lack of comprehension, ie., they may not know how to formulate a request for repetition or clarification; or the student has developed a low sense of self-esteem from making repeated mistakes because of not hearing things correctly and has become less of a risk taker and will pretend to understand even when he doesn't.

Students who won't or can't seek help when they don't understand are at high risk for failure in an inclusive setting. To combat this problem, it is necessary for teachers to check comprehension by periodically asking questions of the student that require expansion of the topic. It may also be necessary to instruct the student in the techniques necessary to request clarification or repetition. Language will not grow nor will it become the instrument for academic learning unless the student who is deaf actively participates in his own language learning.

When a child is deaf or hard of hearing, the auditory input he receives is limited and distorted, therefore, it is not surprising that he makes errors in auditory discrimination and speech articulation. However, the language difficulties which pose the most persistent problems for the student who is deaf or hard of hearing are more profound and not related to the auditory deprivation, but to the very nature of the language itself. These language learning difficulties pervade all aspects of linguistic development. They occur in Semantics (word meaning), Morphology (word affixes and function words) and Syntax (word order). Hearing is the distance sense which allows people to experience events outside their visual field. Deprivation of, or impairment in this distance modality may result in increased concern with the observable, the real, the here and now. Reduced language input and a more concrete orientation are likely reasons for the Semantic (word meaning) difficulties experienced by most children who are deaf or hard of hearing.

Semantics

Researchers have consistently demonstrated that children with hearing problems have difficulty in developing language skills, particularly in comprehension of figurative language such as idioms. Idioms are idiosyncrasies of language that transgress either the laws of grammar or the laws of logic and are not susceptible to grammatical analysis. Essentially, they are all the statements we make in the English language that don't make sense when interpreted literally.

Because the child must decipher idiomatic expressions in terms of what each individual word is understood to mean, the child must guess at their meaning. This means that students who are deaf or hard of hearing are at a serious disadvantage because instructional text, particularly in the middle grades, is replete with figurative language. It has been estimated that two thirds of the English language consist of idiomatic expressions.

The novel, A Proper Acadian, by Mary Alice Downie and George Rawlyk is a good example currently being utilized in many Maritime upper elementary classrooms. Although classified by many as a relatively easy "read", it is replete with figurative language. Students with a hearing loss have a tendency to interpret idioms literally; thus when encountering the statement: "*we will never agree to bear arms against our French and Indian brothers*", the phrase "to bear arms" would lead to misinterpretation of the true meaning.

Idioms like "*Your mother and your Aunt Madeline were very close,*" will often be interpreted that the two sisters were standing in close proximity to each other and one can only imagine the image conjured up by the expression "*She threw her arms around him.*"

Some idiomatic expressions are so commonly used that they are sometimes classified as slang. For example, the expressions "*I want to get it over with,*" and "*They sorted things out,*" remain difficult to decipher for a literal thinker.

Students who are deaf or hard of hearing may lack the linguistic depth and fluency to appreciate the richness of the imagery contained in figurative language. Figures of speech like the following examples from A Proper Acadian: *"Moonlight flowed down the wet road"; "He bolted through the cobbled streets as if ten devils were after him"*; and *"The honking came closer". "High above in the dark sky, a great V cut the moon to pieces."* may paint visual images for the hearing child with their fluent language, however, they will confuse and distract the student who is deaf or hard of hearing.

Multiple meanings of words are another source of semantic confusion. The fact that different cognitive concepts have identical verbal labels is confusing not only to the deaf child but also to people learning English as a second language. They have learned one concept for the word and find it difficult to interpret it in context when that is not the concept being described. When a student has learned to interpret the word *ran* as *"to move by rapid steps faster than walking"*, they will have a lot of difficulty interpreting this statement also taken from A Proper Acadian: *"The dyke ran across the marsh between two spits of higher ground."* Even many of the simpler words in the English language have multiple meanings. For example, the word *run* has fifty-four meanings and the word *catch* has twenty-two.

Incidental learning is crucial in the development of language. The child with normal hearing uses both vision and audition to acquire knowledge. They receive enormous amounts of information through listening to adult conversations, television programs, etc. From all of this information, they formulate concepts and learn to expand those concepts. Later, as they combine information gained from a variety of sources, they learn to recognize the interrelationships among the concepts and thereby acquire generalizations.

For example, the child acquires the concept *ball* and then expands this concept to include: *baseball, football, soccer ball*, and then acquires the categorical term *sports equipment*.

The child with a hearing loss encounters a great deal of difficulty expanding his concepts and acquiring the generalizations because they are severely limited in their ability to acquire language incidentally.

This limitation of their ability occurs for a number of reasons: the acoustic or sound information available to them is limited and sometimes confusing; they not only get less sound - the sound they get is distorted; they only experience language that is directed specifically to them, in a quiet setting, with good light and optimum listening conditions; and adult input is deficient either because people simplify what is said to them or because the adults communicating with them have a limited signing capability.

All of these factors cause the child with a hearing loss to have undeveloped concepts. They may understand one concept for a word, ie., a bank is a building where you go to get or save money, but be unable to comprehend the same label when it is used in a different context, ie., a bank is the land on the side of a river.

They also often possess a restricted knowledge of categorical terms, ie., they may know about "hockey", "swimming", and "baseball", but have difficulty with "sports", or "recreation". Conversely, they fully understand "dog" or "cat" but experience difficulty with the terms "German Shepherd" or "Siamese".

Students with certain types of hearing loss will encounter difficulty comprehending the meaning that is conveyed in the intonation and stress patterns of the message. Often the same message can be drastically altered by changes in intonation and stress. For example, what you say to an old friend you run into at the airport can be exactly what you say to a teenager coming in at four in the morning - "*Where have you been?, What have you been doing?*" However, the difference in intonation and stress will convey totally different meanings. These differences will often be lost on a listener who is deaf or hard of hearing. Not being able to detect these subtle linguistic differences may cause the student with a hearing loss to appear socially unaware.

Knowledge of language involves more than semantic mastery. Another criterion of language competency is the spontaneous and automatic use of acceptable word combinations. This in no way implies the ability to recite the rules of grammar. Rather it refers to the speaker's facility with function words and word affixes (morphology) and the ordered arrangement of words in sentences (syntax). Next we will examine the difficulties posed by the morphology of English.

Morphology

Prepositions, conjunctions, and articles are commonly referred to as function words. These little words don't refer to a specific item yet they are the connective tissue of language. They tie the components of the sentence together, and combined with appropriate word suffixes and prefixes contribute to sentence clarity. However, these little words and word endings are not stressed in speech and are rarely visible on the lips. In fact, many people distort them or do not articulate them at all. For instance: people usually say, "*Let's go for a cuppa coffee or a bottla pop*" rather than clearly articulating *a cup of coffee or a bottle of pop*. As a result, deaf children are often not even aware of the function words existence in the sentence.

Many of the suffixes that we utilize to indicate plurality, verb tenses, or contractions are composed of high frequency sounds that are often unavailable to even a properly amplified deaf student. Not hearing these sounds can result in significant communication difficulties. Imagine the possibilities of not being able to detect the difference between "*You can*" or "*You can't do that*".

Because these features of the language are often unavailable to the student with a significant hearing loss, they often don't appear in their written language. The following samples of the written language of two girls who are deaf or hard of hearing illustrate common patterns of errors.

Ex. A "We went to swimming at the beach. Everyone run into the water but the water very cold. Then we went to canoeing and it fun. At night everyone were sing."

Ex. B "My class was going to roller skating. My roller skates blue and red stripes and the rest white. After they were finish, they talk to some friends."

These types of errors are observed in the developing oral language of young hearing children. Young children overgeneralize regular rules making statements like, "*I bringed my lunch.*" However, unlike the child with the hearing loss, these children are exposed to numerous examples of adults' correct application of the rule. Eventually, they determine that what they are saying does not sound right. Because the child with the hearing loss is denied this wealth of exposure, they will naturally progress more slowly through the linguistic stages experienced by normally hearing students.

Mastering all the complex rules of morphology presents a long term challenge for students who are deaf or hard of hearing.

Syntax

Syntax or the grammar of our language is the system of rules we use to arrange words into meaningful sentences. Some languages rely on word endings or pitch changes to denote the functional relationships between words in a sentence. English, however, uses word order to determine the function and meaning of words in a sentence. Even the order of words within phrases is specified by syntactic rules.

For example, in an English phrase, modifiers always occur in the following order - number, size, color - no other order is acceptable. A child with normal hearing is usually never taught this rule - they deduce it from the constant language input that they receive, however, a child with a significant hearing loss may have to be actually taught this rule before they can formulate correct English phrases.

The production of phrases involves relatively few syntactic rules, but the generation of complex sentences with independent and dependant clauses involves mastery of numerous rules. For a child with a hearing loss, difficulty with syntax is the most striking and persistent problem in their comprehension and production of oral and written English. Following are some of the typical misrepresentations arising from syntactic difficulties.

Studies of the language produced by deaf and hard of hearing subjects indicate that their sentences are simpler, shorter, and more rigid.

They use fewer sentence types and often focus on sentences of the Subject + Verb + Object pattern. As a result, students who are deaf or hard of hearing may connect the nearest subject-verb-object sequence and consequently misinterpret the whole sentence.

Ex: The man who shot the moose had a new rifle.
(May be interpreted as: The moose had a new rifle.)

This also results in students who are deaf or hard of hearing often misinterpreting sentences incorporating the use of passive voice.

Ex: The girl was hit by the boy.
(May be interpreted as: The girl hit the boy.)

Some deaf or hard of hearing students utilize the conjunction "*and*" excessively to conjoin sentences because they lack the linguistic maturity to formulate more syntactically complex sentences. They may primarily employ concrete action verbs and as a consequence of their vocabulary delay, insert several words where one specific word would have sufficed. For example the student will say, "*The poor man has no friends or home. He can't cook supper. His clothes are old, dirty.*" rather than use the more concise, "*The man was a vagrant.*"

Reading

Students who are deaf or hard of hearing often exhibit delayed development in vocabulary and language skills and this has negative effect on their ability to comprehend the written word.

They approach the task of learning to read with limited auditory language and distorted auditory input. A total phonics approach to beginning reading instruction simply directs the focus to the student's area of greatest need.

Basal readers may also be problematic. Although controlled for vocabulary, they employ complex syntax and figurative language at an early level. They presume a level of linguistic proficiency which some deaf or hard of hearing students have not attained. Despite these potential hurdles, students who are deaf or hard of hearing, given good language models and a multimedia approach to teaching reading, can and will learn to read.

Print is the medium in which they meet language in the same form as normally hearing people. Reading will be the tool for their exploration of academic subjects and for the expansion of their language. However, they will experience some problems directly related to their impaired hearing and to the language delay it frequently imposes.

For students who are deaf or hard of hearing, language competency is the key to social and academic success. Social interaction in an environment rich in oral language is the optimum setting to increase this language competency. For teachers, this is the challenge. An awareness of a student's potential language learning difficulties will be the first step in modifying good teaching so that students who are deaf or hard of hearing will attain their true potential in the regular classroom.

Helping the Student who is Deaf or Hard of Hearing in Your Classroom

Suggestions for the Classroom Teacher

The needs of most students can be met without impeding classroom routine. However, we have included a list of general considerations and teaching suggestions which may increase the likelihood of successful inclusion. We offer them in the hope that they will assist you in accommodating and educating the student who is deaf or hard of hearing in your class.

1. ***General Considerations***

- Successful inclusion is the product of careful planning, preparation, and team work. Key team members are the school principal, the classroom teacher, the parents, and the APSEA teacher. Additional help and input should be obtained from available support personnel in psychology, speech and hearing, and medicine. Team members must meet regularly and co-ordinate their efforts in planning the child's program, objectively assessing his progress and evaluating the appropriateness of his current placement.

- The child with a hearing loss is, first of all, a child. Treat him as you do other children in the class. Expect him to meet general classroom standards for both behaviour and academic work.

- Parent involvement is absolutely essential to successful inclusion. Frequent parent-teacher communication will help parents realize that their home provides unique opportunities for social, emotional and linguistic development that go beyond the scope of what is possible in the classroom. Inform and involve parents: use home-school notebooks; send home advance information on upcoming class topics and new vocabulary; arrange parent-teacher teleconferences and meetings; encourage parents to involve their child in extracurricular activities-church groups, sports, Guides and Scouts etc.

Hearing loss often leaves gaps in the incidental learning of general information, specific concepts, vocabulary, idioms, specific nuances, and the rules for common games. A teacher should never assume that the child who is deaf or hard of hearing knows something just because most of the class does. Whenever possible, check for these gaps and ask parents, teacher, or tutor to work on these concepts.

- The child with normal hearing will mirror your attitude towards the child who is deaf or hard of hearing. Familiarize the whole class with hearing, hearing aids and what a hearing loss means. Answer their questions in a matter of fact way. Your comfort in providing information and dealing with their questions will help to demonstrate your acceptance and help them to accept their peers who are deaf or hard of hearing.

- Students may find it difficult to understand the speech of the child who is deaf or hard of hearing. Your sensitivity in dealing with these students will be very important in helping the student who is deaf or hard of hearing adjust to your class and maintain a feeling of self-worth.

- Amplification, when prescribed, is essential for effective classroom participation. However, amplification, unlike eye glasses, does not bring about normal hearing. Unfortunately, all sounds are amplified equally by a hearing aid. As a result, the background noise level may exceed the level of conversation. This can be distracting to the child and make it difficult for him to discriminate speech sounds, particularly during group discussions. An FM amplification unit often reduces some of the background noises and distortions picked up by a personal hearing aid. However, no hearing aid guarantees automatic understanding of everything said.

- A child's hearing loss may fluctuate. The degree of hearing loss is affected by severe colds, respiratory illnesses, changing acoustical conditions in the classroom and auditory fatigue. The concentration that a child who is deaf or hard of hearing must sustain to obtain comprehension can lead to frustration and fatigue.

- Fatigue should not be equated with disinterest, inappropriate behaviour and cognitive delays. Opportunities for recreational activities and independent work can serve as a respite from intensive listening and speechreading.

- It is impossible for a student who is deaf or hard of hearing to take notes and lipread the teacher at the same time. Since the student may miss some of the lecture or classroom discussion, he must rely heavily on class notes when studying for a test or exam. A reliable student who is particularly skilled at taking notes, could be appointed to serve as a "buddy" to the student. The buddy could assist in notetaking, interpretation of directions. He could alert the student who is deaf or hard of hearing to changes in class routine, the correct page in a text, school announcements over the PA system, homework, phrases, brief outlines and discussion summaries.

2. ***Specific Teaching Tips***

To assist in Speechreading (lipreading)

DO

- Face the child when talking.
- Get his attention before speaking to him.
- Signal the beginning of a new topic.
- Repeat or summarize important points made in class presentations or group discussions.
- Check comprehension. Ask the child who is deaf or hard of hearing to repeat directions or to answer questions requiring a substantive response.
- Rephrase your message if the child doesn't understand with repetition only.
- Speak from a position where the light is on your face.
- Speak normally. Use a moderate rate with no exaggerated mouth movements.
- Seat the child where he may see you and the other students.
- Be flexible about seating. Permit the student to move or exchange seats if this is necessary for comprehension.

To Assist the Student to Follow Class Presentations and Discussions

TRY TO

- Present information visually whenever possible. Use overhead projectors, slides, charts, pictures, etc.
- Provide a written summary of the text of audio materials, records, tapes and radio/TV programs.
- Use video and TV programs with closed caption (cc).
- Write new vocabulary, lesson summaries on the blackboard, the overhead, or on handouts.
- Put spelling words in sentences to provide contextual clues.
- Avoid dictation. The child who is deaf or hard of hearing cannot speechread and write at the same time.

To Assist in Language Development

WE RECOMMEND THAT YOU

- Accept the child's imperfect expressive language. Serve as a good language mode by responding to his incomplete utterances with complete structural correct sentences.

- Note the child's language errors and discuss them with the APSEA teacher. Work closely with the APSEA teacher and the parents in developing and reinforcing new vocabulary and providing sufficient practice for specific language structures.

- Use, check comprehension of, and if necessary, teach categorical terms, slang words, idioms and multiple meanings.

- Encourage the child who is deaf or hard of hearing to:
  - speak to you and the other children;
  - inform you or his "buddy" when he has not understood what was said;
  - get involved in class discussion;
  - give oral reports.

- Encourage reading. Work with the parents to stimulate both functional and recreational reading. Arrange visits to the library or bookmobile. Expose the child to content area books, story books, age appropriate magazines, comics, newspapers, etc.

- Ask the child to:
  - repeat directions and reiterate assignments;
  - answer substantive questions throughout the class lessons;
  - produce and proofread written reports and compositions.

- Ask the child to repeat, rephrase, write, dramatize, or draw his message if you do not understand him. Demonstrate your desire to communicate by attending to him until you do understand.

- Familiarize the child with the use of reference materials such as the encyclopedia and the dictionary. Promote the dictionary as an aid to pronunciation. Teach diacritical markings, accent marks, and syllabification.

To Assist in the Use of Residual Hearing

PLEASE

- Make sure the FM and/or hearing aid is:
  - checked each morning;
  - in good working order;
  - turned on;
  - charged each night (FM);
  - worn at all times.
- Keep a spare cord and batteries.
- Attempt to keep background noise to a minimum.
- Notify APSEA personnel if:
  - the child refuses to wear the aid or FM unit;
  - the aid malfunctions or is damaged.
- Note any sudden change in hearing status and report it to the parents.

DON'T

- Mumble, shout, or exaggerate.
- Walk around when talking.
- Obstruct the child's view of your mouth by holding a book in front of your face.

PLEASE DO NOT PRETEND TO UNDERSTAND

Glossary

Articulation Disorder - inability to correctly produce speech sounds (phonemes) because of imprecise placement, timing, pressure, speed, or flow of movement of the lips, tongue or throat.

Assistive Devices - technical tools and devices such as alphabet boards, text telephones (TT/TTY), or text-to-speech conversion software used to assist people with physical or emotional disorders to perform actions, tasks and activities.

Audiologist - health care professional who is trained to identify and measure hearing impairments and related disorders, including balance (vestibular) disorders and tinnitus and to rehabilitate individuals with hearing impairment and related disorders. An audiologist uses a variety of tests and procedures to assess hearing and balance function.

Auditory Brainstem Response (ABR) Test - a test for brain functioning in comatose, unresponsive, etc., patients and for hearing in infants and young children, that involves attaching electrodes to the head to record electrical activity from the hearing nerve and other parts of the brain.

Auditory Nerve - eighth cranial nerve that connects the inner ear to the brainstem.

Auditory Perception - ability to identify, interpret, and attach meaning to sound.

Auditory Prosthesis - devices that substitutes or enhances the ability to hear.

Aural Rehabilitation - techniques used with persons who are hearing impaired to improve their ability to speak and communicate.

Central Auditory Processing Disorder - inability to differentiate, recognize or understand sounds in individuals with normal hearing and intelligence.

Cochlea - snail-shaped structure in the inner ear that contains the organ of hearing.

Cognition - thinking skills that include perception, memory, awareness, reasoning, judgement, intellect, and imagination.

Conductive Hearing Impairment - hearing loss caused by dysfunction of the outer or middle ear.

Cued Speech - method of communication that combines speech reading with a system of handshapes placed near the mouth to help individuals who are deaf or hard of hearing differentiate words that look similar on the lips,(ie. bunch vs. punch) or are hidden, (ie. gag).

Ear Infection - presence and growth of bacteria or viruses in the ear.

Hair Cells - sensory cells of the inner ear, which are topped with hair-like structures, the stereocilia, and which transform the mechanical energy of sound waves into nerve impulses.

Hearing - series of events in which sound waves in the are converted to electrical signals that are sent as nerve impulses to the brain where they are interpreted.

Hearing Aid - electronic device that brings amplified sound to the ear. A hearing aid usually consists of a microphone, amplifier and receiver.

Hearing Disorder - disruption in the normal hearing process whereby sound waves are not converted to electrical signals and nerve impulses are not transmitted to the brain to be interpreted.

Hereditary Hearing Impairment - hearing loss passed down through generations of a family.

Inner Ear - part of the ear that contains both the organ of hearing (the cochlea) and the organ of balance (the labyrinth).

Language - system for communicating ideas and feelings using sounds, gestures, signs or marks.

Language Disorders - any of a number of problems with verbal communication and the ability to use or understand the symbol for interpersonal communication.

Learning Disabilities - childhood disorders characterized by difficulty with certain skills such as reading or writing in individuals with normal intelligence.

Middle Ear - part of the ear that includes the eardrum and three tiny bones of the middle ear, ending at the round window that leads to the inner ear.

Misarticulation - inaccurately produced speech sound (phoneme) or sounds.

Otitis Media - inflammation of the middle ear caused by infection.

Otitis Externa - inflammation of the outer part of the ear extending to the auditory canal.

Otoacoustic Emissions - low-intensity sounds produced by the inner ear that can be quickly measured with a sensitive microphone placed in the ear canal.

Otolaryngologist - physician/surgeon who specializes in diseases of the ears, nose, throat and head and neck.

Otologist - physician/surgeon who specializes in diseases of the ear.

Outer Ear - external portion of the ear, consisting of the pinna, or auricle, and the ear canal.

Perception (Hearing) - process of knowing or being aware of information through the ear.

Phonology - study of speech sounds.

Postlingually Deafened - individual who becomes deaf after having learned language.

Prelingually Deafened - individual who is either born deaf or who lost his or her hearing early in childhood, before learning language.

Sensory Neural Hearing Loss - hearing loss caused by damage to the sensory cells and/or nerve fibers of the inner ear.

Sign Language - language of hand shapes, facial expressions, and movements used as a form of communication, because of muscle weakness or incoordination, or difficulty performing voluntary muscle movements.

Speech - making definite vocal sounds that form words to express thoughts and ideas.

Speech Disorder - any defect or abnormality that prevents an individual from communicating by means of spoken words. Speech disorders may develop from nerve injury to the brain, muscular paralysis, structural defects, hysteria or mental retardation.

Speech-Language Pathologist - health professional trained to evaluate and treat people who have voice, speech, language, or swallowing disorders, including hearing impairment, that affect their ability to communicate.